

## IMPROVEMENT IN A REFRIGERATION SYSTEM FOR CABINETS

Field of the Invention

The present invention refers to an improvement introduced in the refrigeration system of cabinets, 5 such as those applied to horizontal freezers used for cooling or preserving beverages or other products and which comprise a cabinet provided with a top cover.

Background of the Invention

There are well known from the art the refrigerated 10 cabinets provided with a top cover and in which the internal peripheral walls are formed in metallic sheet to operate as a heat exchange enhancing element for an evaporator which is usually defined by a tube seated against the external face of said internal peripheral 15 walls, in a downward spiral development along at least part of the cabinet height.

The upper end of the tube is connected to the expanding element of the refrigeration circuit, the lower end of said tube of the evaporator being 20 maintained in fluid communication with the suction of the compressor that compresses the refrigerant fluid of the refrigeration system.

In the cabinets of the type considered herein, the 25 refrigerant fluid which reaches the upper end of the evaporator, coming from the capillary tube, is evaporated as it flows down the tube, exchanging heat with the thermal load mainly defined by the product to be cooled and which is stored inside the cabinet.

Although adequately operating under normal conditions 30 of re-supplying the thermal load to be refrigerated, the cabinet refrigeration systems arranged in the manner described above are deficient when the thermal load is replaced in a high frequency, which usually occurs when these cabinets are used as a beverage 35 cooler or preserver.

When the refrigeration system of these cabinets is submitted to a high thermal load resulting from a severe loading, the evaporation rate of the refrigerant fluid therein becomes very high, making  
5 the liquid portion of the refrigerant fluid which reaches the evaporator to be rapidly evaporated in the upper part of the internal peripheral walls of the cabinet, practically stopping the refrigeration operation from the moment the whole refrigerant fluid  
10 is evaporated, passing to the vapor state.

As the thermal load is refrigerated from top to bottom, the lower region of the evaporator, which is useless in terms of heat exchange by the fact that it receives only the already vaporized refrigerant fluid,  
15 is progressively reduced, making the evaporator to be also progressively more efficient.

The operational deficiency discussed above, resulting from the reduction of the heat exchange useful extension of the evaporator, exactly in the moment of  
20 highest requirement (with the higher thermal loading of the cabinet) is undesired, since it results in a slower refrigeration rate of the product stored in the cabinet.

#### Object of the Invention

25 It is an object of the present invention to provide an improvement in a refrigeration system for cabinets of the type discussed above, which increases the heat exchange useful extension of the evaporator under high thermal load conditions inside the cabinet, without  
30 requiring constructive alterations to be effected in the latter.

#### Summary of the Invention

The improvement of the invention is introduced in a refrigeration system for a cabinet provided with a top  
35 cover and with internal peripheral walls, made of

metallic sheet and around which is seated an evaporating means connected to the outlet of an expanding device (in its turn connected to a condenser) and to the suction of a compressor of the 5 refrigeration system.

According to the invention, the evaporating means comprises at least two tube extensions, each of them being seated around a respective height portion of the internal peripheral walls, and having a refrigerant 10 fluid inlet end maintained in fluid communication with a respective expanding device and a refrigerant fluid outlet end maintained in fluid communication with the compressor.

Besides reducing the time of refrigeration of a high 15 thermal load, as a function of the reduction of the useless extensions of the evaporator, when operating under determined severe conditions the constructive arrangement described above allows reducing, diametrically, the tube extensions of the evaporator, 20 without increasing the velocity of the refrigerant fluid inside the evaporator. Reducing the diameter of the capillary tube leads to a relevant cost reduction of this material.

Brief Description of the Drawing  
25 The invention will be described below, with reference to the enclosed drawing, in which:

Figure 1 is a schematic lateral view of an internal peripheral wall of a cabinet associated with a refrigeration system provided with an evaporating 30 means constructed according to the present invention.

Description of the Preferred Embodiment  
The single figure of the enclosed drawing illustrates a lateral view of an internal peripheral wall P, in metallic sheet, of a parallelepipedic cabinet provided 35 with a top cover (not illustrated).

Around the internal peripheral walls P of the cabinet is seated and affixed an evaporating means 1, which in the illustrated example comprises two tube extensions 10, each of them being seated around a respective 5 height portion of the internal peripheral walls P.

It should be understood that three or more evaporating portions might be provided affixed around the internal peripheral walls P of the cabinet, each evaporator portion being defined by a respective tube extension 10 disposed in the same spiral development usually applied to this type of evaporating means which uses the internal peripheral walls P of the cabinet as heat exchange fins of the tube extensions, each evaporator portion being connected to an expanding device 2 of 15 refrigerant fluid.

Each tube extension 10 presents a refrigerant fluid inlet end maintained in fluid communication with the outlet of a respective expanding device 2, which in turn is connected to the outlet of a condenser 3 of 20 the refrigeration system, and an outlet end of vaporized refrigerant fluid maintained in fluid communication with a compressor 4 of said refrigeration system.

With the arrangement described above, the evaporating 25 means is replaced by two or more tube-type evaporators, which are arranged in parallel, each covering a portion of the cabinet height, thereby allowing a faster and more homogeneous cooling of the thermal load which will be placed in the cabinet.

30 The parallel arrangement of the evaporators or tube extensions 10 allows the diameter of the capillary tube to be reduced, in order to define a cross-sectional area which is slightly smaller than a portion of the cross-sectional area of the prior art 35 tube required to form the evaporating means with a

single continuous tube extension, corresponding to the number of tube extensions 10.